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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

KALAM, ABUL

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,988	BARNES ET AL.	
	Examiner	Art Unit	
	ABUL KALAM	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-16 is/are pending in the application.
- 4a) Of the above claim(s) 3, 12, 13 and 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 6-11, 14 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/18/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Species 1 in the reply filed on October 5, 2007, is acknowledged. The traversal is on the ground(s) that the common technical feature, to all the claims, is novel over the prior art, specifically the Scherer et al. reference (US 6,534,798). This is not found persuasive because the Scherer et al. reference, as discussed below in this Office Action, discloses the common technical feature as recited in the claims. Thus, claims 1, 2, 4, 6-11, 14 and 15 are given full consideration as they read on the embodiment of Species 1.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1, 2, 4, 6, 7, 9, 14 and 15** are rejected under 35 U.S.C. 102(e) as being anticipated by **Scherer et al. (US 6,534,798**; previously cited, hereinafter Scherer).

With respect to **claim 1**, **Scherer** teaches (**FIGS. 1-3**) an optoelectronic device comprising:

at least one layer **(12)** of semiconductor material **(col. 4: Ins. 40-67)** sandwiched between first and second electrodes **(18 and 22)**, wherein at least one of the electrodes **(22)** is a thin, semitransparent metal **(col. 5: Ins. 27-40)**, covering and separating said layer from air **(FIG. 3)**,

said metal electrode **(22)** having two surfaces, at least one of the surface including a periodic microstructure **(FIG. 2; col. 5: Ins. 32-41)**, wherein the structure and positioning of the periodic microstructure is such that: surface plasmon (SP) polariton modes are supported mainly at an interface between the layer and the metal electrode, and are substantially scattered into propagating light, said propagation being out of the plane of the layer and the metal electrode **(col. 1: Ins. 57-67; col. 2, Ins. 1-5; col. 4: Ins. 23-39)**.

With respect to **claim 2**, **Scherer** teaches the device according to claim 1, as set forth above wherein the periodic microstructure is a grating type structure present at the metal comprising electrode/air interface only **(col. 6: Ins. 44-59)**.

With respect to **claim 4**, **Scherer** teaches the device according to claim 1, as set forth above, wherein the periodic microstructure is one of a periodic sequence of valleys and hills and a periodic sequence of grooves **(“one dimensional grating,” col. 5: Ins. 32-41)**.

With respect to **claim 6**, **Scherer** teaches the device according to claim 1, as set forth above, wherein the periodic microstructure is periodic in more than one direction on the surface **(“two dimensionally periodic structure,” col. 1: Ins. 63-67; col. 2: Ins. 1-5)**.

With respect to **claim 7**, **Scherer** teaches the device according to claim 1, as set forth above, wherein the periodic microstructures are sub-wavelength (**col. 8: Ins. 39-54; col. 16: Ins. 56-58**).

With respect to **claim 9**, **Scherer** teaches the device according to claim 1, as set forth above, wherein the device is a light emitting diode (**col. 1: Ins. 57-67**).

With respect to **claims 14 and 15**, **Scherer** teaches (**FIGS. 1-3**) an optoelectronic device comprising:

at least one layer (**12**) of semiconductor material (**col. 4: Ins. 40-67**) sandwiched between first and second electrodes (**18 and 22**), wherein at least one of the electrodes (**22**) is a thin, semitransparent metal (**col. 5: Ins. 27-40**), covering said layer (**FIG. 3**),

said metal electrode (**22**) having two surfaces, at least one of the surface including a periodic microstructure (**FIG. 2; col. 5: Ins. 32-41**), wherein the structure and positioning of the periodic microstructure is such that: surface plasmon (SP) polariton modes are supported mainly at an interface between the layer and the metal electrode, and are substantially scattered into propagating light, said propagation being out of the plane of the layer and the metal electrode (**col. 1: Ins. 57-67; col. 2, Ins. 1-5; col. 4: Ins. 23-39**).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Scherer ('798)**, as applied above to the claims above, respectively, and further in view of **Arnold et al. (US 2004/0012328)**; previously cited, hereinafter, Arnold).

With respect to **claim 3**, (*as best interpreted by the Office*) **Scherer** teaches the device according to claim 2, as set forth above in claims 1 and 2, including wherein the periodic microstructure is selected from a grating type structure present at the metal comprising electrode/air interface only (**col. 6: Ins. 44-59**).

Thus, **Scherer** teaches all the limitations of claim 3 with the exception of explicitly disclosing: wherein there is present an encapsulating layer on the electrode.

However, **Arnold** teaches a optoelectronic device with periodic microstructures wherein an encapsulating layer (**32**) is formed on the electrode (**30**) to protect the electrode and the underlying layers (**pg. 2: [0022]**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of **Scherer** with the teaching of **Arnold**, to form an encapsulating layer on the electrode for the disclosed intended purpose of the protecting the electrode and the underlying layers (**pg. 2: [0022]**).

With respect to **claim 8**, **Scherer** teaches all the limitations of the claim, as set forth above in claim 1, with the exception of disclosing: wherein the metal comprising electrode is an aluminum cathode.

However, **Scherer** discloses wherein the metal comprising electrode is silver (**col. 6, Ins. 46-48**). **Arnold** teaches an optoelectronic device wherein the metal comprising electrode can be a silver cathode or an aluminum cathode (**pg. 6: [0105]**).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of **Scherer** with the teaching of **Arnold**, because substituting aluminum for silver would have been considered a mere substitution of art recognized equivalent materials (MPEP 2144.06).

With respect **claim 10**, **Scherer** teaches all the limitations of the claim as set forth above in claim 9, with the exception of disclosing: wherein the light emitting diode is an organic light emitting diode.

However, **Arnold** teaches that organic light emitting diodes are well known in the art (**pg. 1: [0006]-[0010]**). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of **Scherer** to form an organic light emitting diode, as taught by **Arnold**, because organic light emitting diodes are well known in the art.

4. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Arnold ('328)**.

With respect to **claim 11**, **Arnold** teaches (**Fig. 3**) an optoelectronic device comprising:

at least one layer (**19**) comprised of one of a dielectric and semiconductor material (**¶ [0022]**),

first and second electrodes (**18 and 30**), said electrodes sandwiching the at least one layer (**19**), wherein at least one of the electrodes (**30**) is a thin, semitransparent metal (**¶ [0022]**), covering said layer (**19, FIG. 3**),

said metal electrode (**30**) having two surfaces, said metal electrode comprises a grating type structure on each of said two surfaces (**¶ [0025], [0027]**), wherein the structure and positioning of the periodic microstructure is such that: surface plasmon (SP) polariton modes are supported mainly at an interface between the layer and the metal electrode, and are substantially scattered into propagating light, said propagation being out of the plane of the layer and the metal electrode (**¶ [0027]**).

Thus, **Arnold** teaches all the limitations of the claim with the exception of explicitly disclosing wherein the microstructure of the two metal surface are out of phase by substantially π radians.

However, the limitation of “substantially π radians” does not appear to be critical (Applicant has not provided any evidence of critically for such dimensions), and thus, one of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization. Note that Applicant has not disclosed that the

Art Unit: 2814

dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears that the device would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are *prima facie* obvious, absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form a microstructure with the claimed phase difference because, the dimension is not critical since it can be optimized during routine experimentation, depending upon the desired surface plasmon effect.

Response to Arguments

5. Applicant's arguments filed February 12, 2007, have been fully considered but they are not persuasive.

With respect to claim 1 and the Scherer reference, Applicant argues:

"The Scherer reference clearly discloses that it does not cover the underlying layer because it specifically discloses that the pattern is formed by modulating the top metal thickness between "40 nm and 0 nm." A 0 nm thickness metal layer means that there is no material covering the metal layer and thus is a hole. Scherer does not comply with Applicants' claim requirement of "covering" the layer.. As a result, independent claim 1 and claims 2, 5-7 and 9 dependent thereon cannot be anticipated by the Scherer reference."

The argument is not persuasive. The portion of the metal electrode (22), that is 40 nm thick, covers the layer of semiconductor material (12, Fig. 1). Furthermore, Fig. 3 of Scherer clearly shows the metal electrode (the top "SILVER" layer) covering a portion of the semiconductor layer. Note that the claim does not require the metal electrode to cover the "entire" layer.

With respect to claims 3, 8 and 10 and the Arnold reference, Applicant argues:

"Furthermore, Arnold is not available as a reference against any claims in the pending application. Arnold was published January 22, 2004 and is only available as of its publication date. The present application, as can be seen from the U.S. PTO filing receipt, is a national phase entry of International PCT Application PCT/GB03/003343 filed on July 31, 2003. Thus, the International application was filed prior to the Arnold publication date and therefore Arnold is not available as a prior art reference against the present application."

The argument is not persuasive. Arnold was filed on July 16, 2002, which is prior to Applicant's PCT date of July 31, 2003, and foreign priority date of August 2, 2002. Thus, Arnold is applicable as prior art under 35 USC 102(e).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 2814

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ABUL KALAM whose telephone number is (571)272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K./
Examiner, Art Unit 2814

/Phat X Cao/
Primary Examiner, Art Unit 2814